CLAIMS

What is claimed is:

1.   A method of obtaining multiple spatially-heterodyned holograms, comprising:

digitally recording a first spatially-heterodyned hologram including spatial heterodyne fringes for Fourier analysis;

digitally recording a second spatially-heterodyned hologram including spatial heterodyne fringes for Fourier analysis;

Fourier analyzing the recorded first spatially-heterodyned hologram by shifting a first original origin of the recorded first spatially-heterodyned hologram including spatial heterodyne fringes in Fourier space to sit on top of a spatial-heterodyne carrier frequency defined as a first angle between a first reference beam and a first object beam;

applying a first digital filter to cut off signals around the first original origin and performing an inverse Fourier transform on the result;

Fourier analyzing the recorded second spatially-heterodyned hologram by shifting a second original origin of the recorded second spatially-heterodyned hologram including spatial heterodyne fringes in Fourier space to sit on top of a spatial-heterodyne carrier frequency defined as a second angle between a second reference beam and a second object beam; and

applying a second digital filter to cut off signals around the second original origin and performing an inverse Fourier transform on the result,

wherein digitally recording the first spatially-heterodyned hologram is completed before digitally recording the second spatially-heterodyned hologram and a single digital image includes both the first spatially-heterodyned hologram and the second spatially-heterodyned hologram.

2.   The method of claim 1, wherein a single pixilated detection device is used both to digitally record the first spatially-heterodyned hologram and to digitally record the second spatially-heterodyned hologram.

3.   The method of claim 2, further comprising reading and clearing the single pixilated detection device after digitally recording the first spatially-heterodyned hologram and before

digitally recording a second spatially-heterodyned hologram.

4.   The method of claim 3, further comprising:

rotating the first spatially-heterodyned hologram to define a rotated digital image including spatial heterodyne fringes for Fourier analysis; and then

adding the rotated digital image to the second-spatially heterodyned hologram to define the single digital image.

5.   The method of claim 4, wherein, with respect to the single digital image, the spatial heterodyne fringes of the rotated digital image are substantially orthogonal with respect to the spatial heterodyne fringes of the second spatially-heterodyned hologram.

6.   The method of claim 2, further comprising rotating the single pixilated detection device after digitally recording the first spatially-heterodyned hologram including spatial heterodyne fringes for Fourier analysis and before digitally recording a second spatially-heterodyned hologram including spatial heterodyne fringes for Fourier analysis

7.   The method of claim 6, wherein, with respect to the single digital image, the spatial heterodyne fringes of the first spatially-heterodyned hologram are substantially orthogonal with respect to the spatial heterodyne fringes of the second spatially-heterodyned hologram.

8.   An apparatus to obtain a spatially-heterodyned hologram, comprising:

a source of coherent light energy;

a reference beam subassembly optically coupled to the source of coherent light;

an object beam subassembly optically coupled to the source of coherent light;

a beamsplitter optically coupled to both the reference beam subassembly and the object beam subassembly; and

a pixelated detection device coupled to the beamsplitter,

wherein the pixelated detection device is rotatable about an axis that is substantially normal to a focal plane of the pixelated detection device.

9.   The apparatus of claim 8 wherein the reference beam subassembly does not include a

reference beam mirror.

10.   The apparatus of claim 9, wherein the reference beam subassembly includes a reference beam illumination lens.

11.   The apparatus of claim 9, wherein the source of coherent light energy includes a laser.

12.   The apparatus of claim 11, wherein the laser is operated in pulse mode.

13.   The apparatus of claim 8, wherein the object beam subassembly includes a plurality of individually selectable objective lenses.

14.   The apparatus of claim 8, wherein at least one subassembly selected from the group consisting of the reference beam subassembly and the object beam subassembly includes a spatial filter.

15.   The apparatus of claim 8, wherein at least one subassembly selected from the group consisting of the reference beam subassembly and the object beam subassembly includes an acousto-optic modulator.

16.   The apparatus of claim 8, wherein at least one subassembly selected from the group consisting of the reference beam subassembly and the object beam subassembly includes a polarizer.